MANITOBA'S REPORT ON

CLIMATE CHANGE FOR 2012

PROGRESS UPDATE ON MANITOBA'S EMISSION REDUCTIONS

AS REQUIRED UNDER SECTION 5 OF

The Climate Change and Emissions Reductions Act (CCERA)

Part of:
TOMORROW NOW
Manitoba's GREEN Plan

Manitoba

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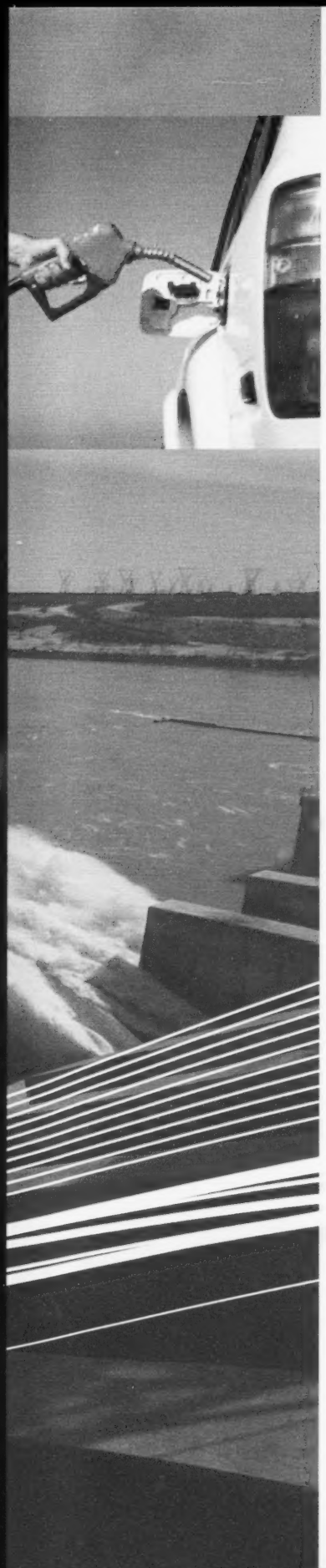

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MESSAGE FROM THE MINISTER OF CONSERVATION AND WATER STEWARDSHIP

On behalf of the Manitoba Government, I am pleased to present the 2012 report on climate change for the province of Manitoba as required under *The Climate Change and Emissions Reductions Act*.

The Manitoba government continues to be a leader on climate change. In 2008, we passed progressive new climate change legislation, and we continue to seek new and innovative ways to reduce our emissions while adapting to the impacts of climate change.

Together, we have made great progress. Our 2008 to 2012 climate change plan has been fully implemented, and in 2012 alone, our programs reduced emissions by over one million tonnes. Manitoba has regulated the use of coal for electricity and banned it as a heating fuel and is the first province to ban petroleum coke as a space heating fuel. Our biofuels mandates continue to achieve significant, ongoing greenhouse gas (GHG) reductions in the transportation sector, Manitoba Hydro`s Power Smart program is helping to reduce natural gas consumption, and landfill gas is now being captured and destroyed at waste management facilities in Winnipeg and Brandon as required under provincial regulation.

Our actions are showing results. For example, between 2000 and 2012 our population grew by 13 per cent, our economy grew by 31 per cent, while our emissions decreased by two per cent. Manitoba's agriculture, bioproducts, industrial and transportation sectors continue to thrive. Through the development of Manitoba's green economy strategy, a new lens for green growth will allow us to expand this burgeoning sector. We are well positioned to be a green leader, while 99 per cent of our energy comes from clean renewable hydro; examples of green innovation abound in our province.

With Manitoba's *Beyond Kyoto* climate plan now in place, it is time to work together toward crafting new climate and green economy strategies for our province. This is why our government has asked the International Institute for Sustainable Development to consult with Manitobans on how we can tackle climate change while fostering a green and prosperous economy. It is essential that we manage the risks and opportunities associated with climate change, and develop new indicators for tracking progress.

Climate change is a challenging issue to address. While government has a clear role to play, we cannot be successful without engaging the public, our First Nations communities, the private sector and countless stakeholders. Governments acting alone cannot solve this problem; we have a shared responsibility to avert a future climate crisis, and a common obligation to protect the earth for future generations.

Climate change is real, and its impacts are being experienced throughout Manitoba and around the globe. The input of Manitobans in upcoming workshops and stakeholder events will be essential to developing Manitoba's new climate change plan.

I look forward to hearing from you as we work together to fight climate change, create more sustainable communities and grow a prosperous, green economy.

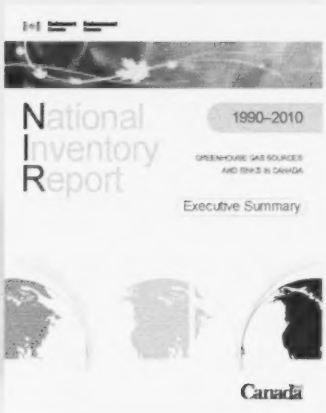
Sincerely,

Gord Mackintosh, MINISTER

CONSERVATION AND WATER STEWARDSHIP

MANITOBA'S REPORT ON CLIMATE CHANGE FOR 2012

1. EXECUTIVE SUMMARY



NOTE: **All provinces, including Manitoba rely on Environment Canada's annual *National Inventory Report* (NIR) to track and report GHG emissions. The NIR is released 18 months after each reporting year. Environment Canada has released provincial emissions NIR data for the 2011 reporting year. The 2012 NIR will be released in the spring of 2014.**

In the absence of actual emissions' estimates from Environment Canada, Manitoba Conservation and Water Stewardship's Climate Change Branch, with assistance from partner departments, has projected our provincial emissions using data provided by Statistics Canada, Environment Canada, Natural Resources Canada, Manitoba Hydro and the Manitoba government.

In 2008, Manitoba enacted *The Climate Change and Emissions Reductions Act*, which set a target of reducing greenhouse gas (GHG) emissions to six per cent below 1990 levels by 2012, and required the province to report on whether emissions in 2010 were less than they were in 2000. Also in 2008, Manitoba released *Beyond Kyoto*, an action plan on climate change that outlined over 60 actions to reduce GHG emissions and adapt to the impacts of climate change across multiple sectors including energy, transportation, agriculture, municipalities, businesses and government operations.

Manitoba's climate change response is anchored on three pillars:

- reducing Manitoba's GHG emissions
- adapting to the anticipated impacts of climate change
- collaborating and sharing best practices with other jurisdictions

These three pillars served as the framework for guiding Manitoba's actions and fulfilling the commitments outlined in *Beyond Kyoto*.

Manitoba's 2012 status report on climate change provides an update on our progress in meeting our *Beyond Kyoto* and CCERA commitments.

This report:

- describes the policy context of Manitoba's climate change efforts
- compares Manitoba's total emissions from 1990 to 2012 and our Kyoto goal
- describes the emissions reductions that have been achieved in Manitoba, and in other jurisdictions, as a result of actions taken in Manitoba
- describes future emissions reductions that are likely to be achieved in Manitoba, and in other jurisdictions, by 2020 and 2025, as a result of actions taken in Manitoba
- describes actions and results in the areas of energy, transportation, agriculture, business and government
- describes the government's efforts to further inter jurisdictional co-operation in reducing emissions
- outlines Manitoba's progress in assessing and adapting to the impacts of a changing climate

2. OVERVIEW

In September 2013, the Intergovernmental Panel on Climate Change (IPCC) released its Fifth Assessment Report (AR5) on the Physical Science Basis for climate change. The report considers new evidence of climate change based on scientific analysis and concludes that:

- warming of the climate is unequivocal
- each of the last three decades has been successively warmer
- the time period from 1983 to 2012 was likely the warmest 30 year period in the last 1,400 years (IPCC, 2013)

In Manitoba, we are already experiencing the impacts of climate change. These include warmer temperatures, changes in rainfall and water availability, declining snow and ice cover and extreme weather that could lead to increased risk of flooding and erosion in spring and greater risk of droughts in summer. These anticipated effects could result in declines in agricultural productivity, damage to ecosystems and biodiversity leading to changes in productivity and loss of plant and animal species, including moose, caribou and polar bear.

Warmer temperatures will put northern roads, railways and other community infrastructure at risk due to permafrost thawing and erosion, resulting in a shorter winter road season. Changes in snow cover and sea-ice conditions, along with ecosystem impacts, will continue to affect access to traditional foods. If not addressed, these changes will have far-reaching effects on the sustainability of our province.

NOTE: **All carbon dioxide equivalent (CO_2e) units cited throughout this report are recorded in kilotonnes (kt) or megatonnes (Mt). CO_2e units less than 10 kt are rounded to the nearest 0.1 Kt (ex: 6.8 kt). All other CO_2e units are rounded to the nearest kt (ex: 320 kt).**

Located near the centre of North America, the province of Manitoba has an extreme continental climate, with monthly average temperatures ranging from -20°C to 25°C over a typical year. Manitoba's population is approximately 1.26 million, with about 780,000 living within the Winnipeg capital region. Other major regional centres include Brandon to the west, Thompson in the north and Steinbach to the east. Consistent with the importance of agriculture, forestry and mining to our economy, many Manitobans reside in rural and northern communities throughout the province.

The Keeyask Project will produce fewer greenhouse gases in a century of operation than an equivalent gas-fired station would produce in half a year.

Manitoba has one of the strongest, most diverse economies in Canada, with a gross domestic product of $43 billion. In 2012, our economy outpaced Canada in overall growth with almost all industries posting positive gains. Key economic sectors include: agriculture and agribusiness; aerospace; building materials; electricity and natural gas; environmental industries; financial services; heavy vehicle manufacturing; mining, minerals and petroleum; transportation and logistics. Economic activities related to electricity and natural gas, environmental industries, mining and petroleum are spread out across the province.

Manitoba is blessed with an abundance of clean renewable hydro. In 2012, over 99 per cent of Manitoba's electricity generation came from renewable generation sources, and Manitoba's GHG emissions from this sector are among the lowest in Canada. The Pembina Institute compared the life-cycle greenhouse gas emissions of power generating technologies and found Keeyask to have the lowest greenhouse gas emissions per GW.h. The Keeyask Project will produce fewer greenhouse gases in a century of operation than an equivalent gas-fired station would produce in half a year.[1]

1 Manitoba Hydro, Needs For and Alternatives To Appendix 7.3 - Life Cycle Greenhouse Gas Assessment Overview

Manitoba comprises approximately 2.8 per cent of Canada's total GHG emissions. Our emissions profile is unique among Canadian jurisdictions. Unlike other Canadian provinces – whose GHG emissions are released by a small number of large emitters – the majority of Manitoba's GHG emissions come from many dispersed smaller emitters within a wide range of sectors.

The 2012 GHG estimates for jurisdictions other than Manitoba will not be available from Environment Canada until April 2014, comparison between 2011 and 2012 GHG emissions for other provinces and territories is not possible at this time. The most current year-to-year comparison for all Canadian jurisdictions is from 2010 to 2011 is outlined below.

PROVINCE/TERRITORY	GREENHOUSE GAS EMISSIONS ($KT\ CO_2e$)		
	2010	2011	% CHANGE
Newfoundland/Labrador	9,350	9,360	0.1%
Prince Edward Island	2,000	2,200	10.0%
Nova Scotia	20,100	20,400	1.5%
New Brunswick	18,300	18,600	1.6%
Quebec	80,300	80,000	-0.4%
Ontario	174,000	171,000	-1.7%
Manitoba	**19,664**	**19,522**	**-0.7%**
Saskatchewan	72,300	72,700	0.6%
Alberta	238,000	242,000	1.7%
British Columbia	59,900	59,100	-1.3%
Yukon	341	374	9.7%
North-West Territories	1,340	1,420	6.0%
Nunavut	422	225	-46.7%

Source: Environment Canada, National Inventory Report, 2013

3. IMPLEMENTING MANITOBA'S 2008 TO 2012 CLIMATE CHANGE PLAN

Manitoba has fully implemented its 2008 to 2012 climate change plan, with over 60 actions carried out across multiple sectors.

Manitoba has shown demonstrable progress in reducing emissions since 2000. As legislated under *The Climate Change and Emissions Reductions Act* (CCERA), Manitoba achieved its interim GHG emission reduction target to stabilize emissions at 2000 levels, by 2010.

Although emissions were up slightly in 2012 from the previous year (largely due to a return to normal levels of crop production following flooding in 2011), emissions still remain two per cent lower than they were in 2000. Year-to-year GHG comparisons are highly influenced by a number of external factors such as weather, agricultural crop yields and the economy, to name a few. Longer-term GHG trends as opposed to year-over-year fluctuations are an accurate reflection of change and tend to filter out external influences.

The province has made significant progress in putting its GHG emission reduction programs into practice and is also undertaking several new initiatives:

- setting a provincial energy saving target of 842 megawatts (MW) of electricity by 2017, as well as expanding renewable power production through hydroelectric, geothermal, wind, solar and biomass power production
- expanding energy efficiency through new building codes and standards; programs for homeowners, low-income housing, businesses and farms; and adding on-bill financing for commercial customers
- implementing an enhanced provincial biofuels mandate
- limiting Brandon coal-fired generating station to use only in emergencies
- requiring large landfills to capture methane gas
- implementing a Clean Energy Strategy in 2012 which outlines made-in-Manitoba solutions to harness water, wind, solar, and biomass resources within the province
- introducing a tax on coal emissions that came into effect in January 2012, and dedicating 100 per cent of all coal tax revenues to support conversion to biomass energy, banning the use of coal and petroleum coke for space heating and taxing petroleum coke used for non-space heating purposes
- creating the Biomass Economy Network (BEN), a coalition of stakeholders from institutions, ENGOs, industry associations, business and government working together to grow Manitoba's biomass economy
- advocating for an improved national electrical grid that can transport clean, renewable energy to every region in Canada

MANITOBA'S CLIMATE CHANGE ACTION MILESTONES

2007

- Green Building Policy put into effect
- Lower Income Residential Efficiency Program implemented
- ecoENERGY Retrofit Homes Program (Canada-Manitoba) launched
- continued implementation to date of Manitoba Hydro Power Smart Program

2008

- *Beyond Kyoto* climate change plan released
- Climate Change and Emissions Reduction Act (CCERA) put into effect
- Trees for Tomorrow Program implemented (2008-2012)
- Manitoba commits $17.5 million in capital funding to Phase 1 of Rapid Transit

2009

- new legislation to restrict use of the coal-fired electrical generating station in Brandon
- ethanol grant regulation in place
- Green Energy Equipment Tax Credit extended to solar thermal heating systems purchased for use in Manitoba
- Energy Efficiency Standards for Replacement of Forced Air Gas and Small Boilers Regulation under the *Energy Act* is put into effect
- GrEEEn (economically and environmentally efficient) Trucking Program launched
- Manitoba introduces $10 per tonne landfill levy
- three-year Manitoba Sustainable Agriculture Practices Program (MSAPP) implemented
- Environmental Farm Action Program implemented from 2009/10-2012/13

2010

- biodiesel grant regulation in place
- Prairies Regional Adaptation Collaborative implemented
- changes to building and plumbing codes to increase energy and water efficiencies

2011

- incentives offered for geothermal installations
- St Leon wind capacity expanded to 120MW
- 138 MW St. Joseph wind farm is commissioned
- Plug-in Hybrid Electric Vehicle (PHEV) demonstration completed
- Manitoba Electric Vehicle Road Map released
- Manitoba commits more than $17 million in support of active transportation infrastructure

2012

- emissions Tax on Coal takes effect January 1, 2012
- Manitoba Climate Investment Pilot Program provides $230,000 in grants help The Forks, The University of Winnipeg, and Cypress Colony measure and reduce their GHG emissions
- Manitoba Clean Energy Strategy released
- Manitoba Hydro's 200 MW Wuskwatim hydroelectric generating station becomes fully operational
- Manitoba launches Biomass Energy Support Program
- Manitoba launches Tomorrow Now outlining strategic priorities on climate change and Manitoba's Climate Change Adaptation Pathway
- four new climate change adaptation projects approved by Natural Resources Canada

3.1 | GREENHOUSE GAS MITIGATION PROGRAMS IN 2012

Programs and activities outlined in *Beyond Kyoto* contributed to significant GHG reductions in 2012. Total GHG reductions resulting from those actions increased from 914.3 kilotonnes (kt) in 2010 to 939.4kt and 1,018.5 kt in 2011 and 2012, respectively. Among the largest projected sources of GHG reductions in 2012 were the ethanol mandate (410 kt), implementation of regulation limiting the use of Manitoba Hydro's single remaining coal fired facility (343 kt), and Manitoba Hydro's Power Smart programs (140 kt).

PROJECT DESCRIPTION	GHG REDUCTIONS IN 2010 (KILOTONNES CO_2e)	GHG REDUCTIONS IN 2011 (KILOTONNES CO_2e)	ESTIMATED GHG REDUCTIONS IN 2012 (KILOTONNES CO_2e)
Limit Manitoba Hydro's Brandon Unit 5 coal-fired facility to emergency service provision	350	348	343
Manitoba's Ethanol Mandate (8.5 per cent blend)	355	354	410
Manitoba's Biodiesel Mandate (2 per cent blend)	58	67	74
Manitoba Hydro's *Power Smart* programs - natural gas savings (estimated 59 million cubic metres of natural gas in 2010/2011)	112	116	140
Brandon Landfill Gas (LFG)	-	7	19
Brady Landfill Gas (LFG)	-	-	*
Manitoba Sustainable Agriculture Practices Program (MSAPP)	22	36	22
Environmental Farm Action Program (EFAP)	2.8	3.7	1.7
Climate Friendly Farm Woodlot Practices Program (CFWP)	2.9	2.7	2.8
Manitoba Organic Transition Program (MOTP)	5.9	-	-
Manitoba Incentives offered for geothermal installations	2.4	2.4	2.5
Manitoba Vehicle Scrappage Program	2.3	-	-
GrEEEn Trucking Program	1.0	2.6	3.5
TOTAL(S)	**914.3**	**939.4**	**1,018.5**

*Commenced in August 2013, annual emissions reductions from Brandon landfill gas are noted in Section 7.3 below.

3.2 | REDUCING EMISSIONS IN OTHER JURISDICTIONS

Hydropower, wind energy production and electricity savings from Power Smart programs all contribute to surplus clean electricity exports to other jurisdictions that would otherwise generate electricity by burning fossil fuels. Manitoba Hydro produces the vast majority of its electricity from the natural power of water at its 15 hydroelectric generating stations. The abundance of Manitoba's water resources, combined with these hydroelectric generating stations, allows Manitoba Hydro's electricity to be virtually free of GHG emissions.

From 1991 to 2012, Manitoba Hydro's net exports are estimated to have displaced GHG emissions by 186 Mt of CO_2e. This is equal to approximately 40 per cent of Manitoba's total provincial emissions over the same time period.

In 2012, Manitoba Hydro's net clean electricity exports (exports less any imports) contributed to emission reductions in other jurisdictions of almost 6.3 Mt of CO_2e, equal to 32 per cent of Manitoba's emissions in 2012.

In 2012, Manitoba Hydro, working with the Nisichawaysihk Cree Nation, completed the 200 MW Wuskwatim Generating Station. Electricity from the Wuskwatim Generating Station contributes to annual emission displacements of approximately 1,000 kt of CO_2e. The much larger, proposed Keeyask (695 MW) and Conawapa (1485 MW) generating stations, will make even greater contributions to emission reductions.

Since 2006, a total of 133 wind turbines have been erected over 218 square kilometres in St. Leon and St. Joseph, Manitoba. The combined capacity of these wind farms is now 258 MW and in 2012, they produced enough power to meet the needs of over 87,000 homes. The emission reductions associated with wind power are included in Manitoba Hydro's accounting of net emissions displaced from exports. In 2012, these wind farms contributed to 660 kt in emission reductions outside Manitoba.

3.3 | LAND USE AND FORESTRY

The land use, land use change and forestry (LULUCF) sector represents an important source of both GHG emissions and carbon storage from soils, crops, forest and wetlands, and the changes to these land uses. Emissions and removals in the LULUCF sector are excluded from provincial totals in the national GHG inventory report. However, Manitoba's forests, wetlands and agricultural lands have sequestered an average of 5.5 Mt of CO_2e per year since 1990.

3.4 | MANITOBA'S PROJECTED EMISSIONS FOR 2012 – BY SECTOR

On average, Manitoba comprises about 2.8 per cent of Canada's total GHG emissions. Our economic structure and rich hydro resources result in Manitoba having the lowest percentage of GHG emissions from stationary combustion sources within the energy sector (17.1 per cent) among all Canadian jurisdictions. Because of our clean energy profile, emissions from agriculture and transportation (a sub-category of the energy sector) are our largest two sources of emissions – comprising roughly one-third each.

NOTE: **For this chart titled Manitoba's Projected Emissions by Sector (2012):**

kt – ***is the carbon dioxide equivalent (CO_2e) measurement in kilotonnes (1,000 tonnes equals one kilotonne)***

Agriculture – ***includes enertic fermentation, manure management, agriculture soils and field burning of agricultural residues***

Energy: Stationary Combustion – ***includes commercial, institutional and residential heating; electricity and heat generation; manufacturing; construction ; mining and oil and gas extraction; fossil fuel production and refining; and agriculture and forestry***

Energy: Transportation – ***includes road transportation (on and off-road vehicles - gasoline and diesel; propane and natural gas vehicles); railways; navigation (domestic marine); civil aviation (domestic aviation); and other transportation (pipelines)***

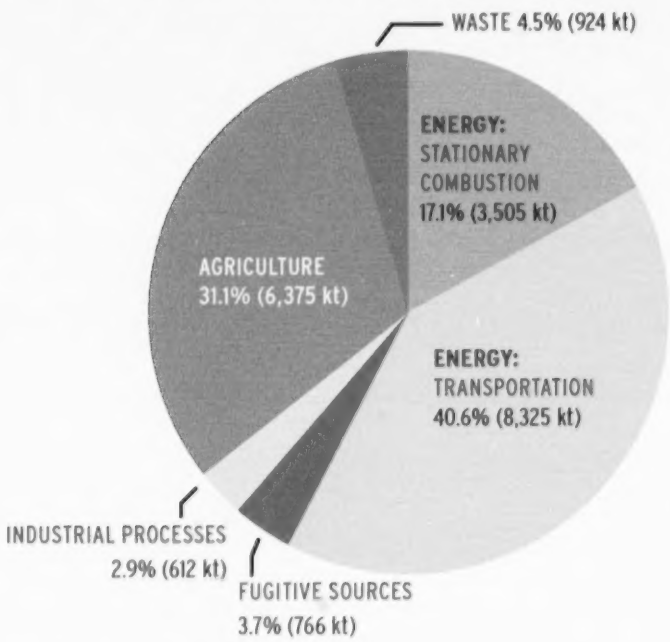
Fugitive Sources – ***includes emissions from coal mining, oil and natural gas***

Industrial Processes – ***includes mineral products, chemical industry and metal production; production and consumption of halocarbons and SF_6; and other and undifferentiated production***

Solvents and Other – ***includes emissions related to the use of N_2O as an anesthetic and propellant***

Waste – ***includes solid waste disposal on land, wastewater handling and waste incineration***

MANITOBA'S PROJECTED EMISSIONS BY SECTOR (2012)



Note: "Solvents and Other" are not shown in the chart above.
The projected Manitoba emissions for this sector in 2012 are 9 kt (0.0%).

As shown above, Manitoba's GHG emissions for 2012 are projected to be approximately 20.5 Mt, with our transportation and agriculture sectors being our largest sources. These sectors are followed by stationary combustion sources within the energy sector (17 per cent), waste (five per cent), fugitive energy sources (four per cent) and industrial processes (three per cent). Although the graph below shows transportation emissions at 40 per cent of Manitoba's total, these include off-road emissions from equipment used in agriculture, forestry, mining and construction sectors, as well as emissions from pipelines. Transportation emissions from road, rail, marine and air (excluding off-road activities) comprised roughly 34 per cent of Manitoba's emissions in 2012.

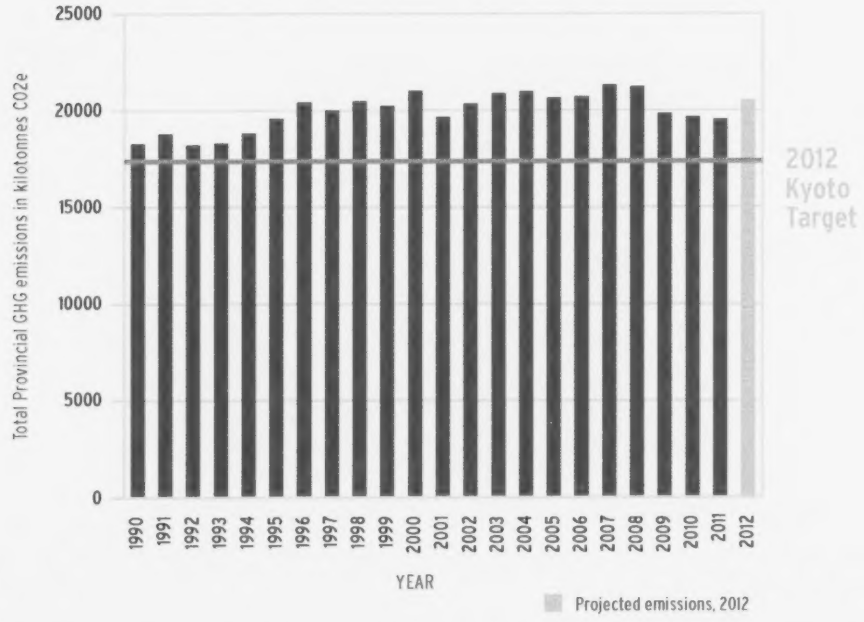
4. MANITOBA'S 2010 AND 2012 CLIMATE CHANGE TARGETS

Climate change targets serve as an important yardstick for measuring progress on reducing emissions and help spur action. In 2002, Manitoba became the first province to consult with citizens on the issue of climate change and establish targets that were harmonized with those of the federal government. The Kyoto target was adopted by Manitoba, along with an interim target of stabilizing emissions at year 2000 levels by 2010.

From 1990 to 2000 Manitoba's emissions increased by 2.7 Mt (15 per cent), whereas between 2000 and 2012 emissions decreased by 0.5 Mt (2.4 per cent). Manitoba's emissions in 2012 are approximately 2.2 Mt (12 per cent) above 1990 levels. Between 2010 and 2012 our climate change programs reduced provincial GHG emissions by approximately 2.9 Mt. Despite these efforts Manitoba is projected to be approximately 3.3 Mt shy of achieving its Kyoto target.

HISTORICAL GREENHOUSE GAS EMISSIONS (CO_2e) FOR MANITOBA 1990-2012

Source: Manitoba Conservation and Water Stewardship, 2013

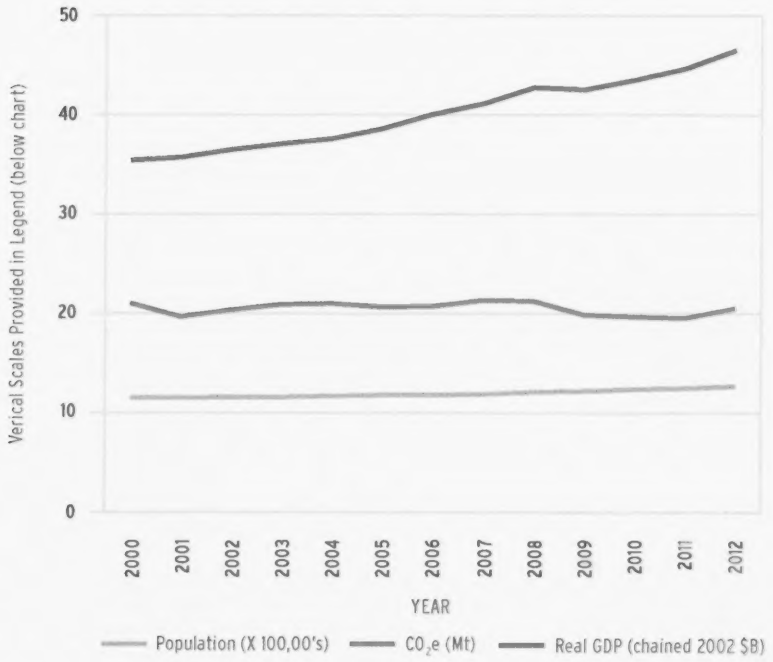


Short-term comparisons of emissions can be influenced significantly by external factors such as drought or flooding, crop yields, and the economy. While year-over-year fluctuations in emissions often result from external factors, long-term trends are more indicative of structural changes to the economy that will have a sustained impact on our emissions performance for years to come.

Other metrics should be considered in order to assess progress over the long-term. For example, between 1990 and 2012 our population grew by 17 per cent and our economy grew by 58 per cent. Despite the fact that emissions increased on an absolute basis, emissions per unit of gross domestic product (GDP) declined by 29 per cent over this period, while emissions per capita declined by four per cent over the same time frame.

MANITOBA POPULATION, GHG, GDP 2000-2012

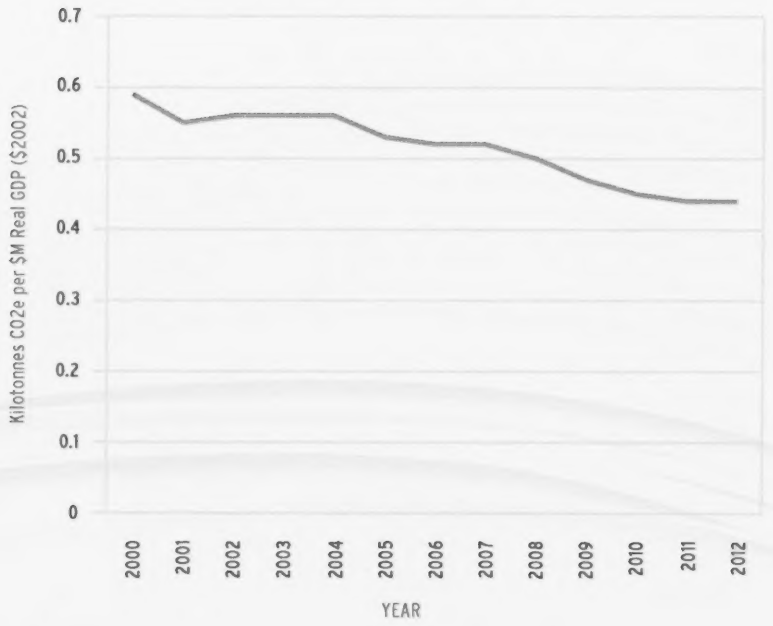
Source: Manitoba Conservation and Water Stewardship, 2013



Similar trends can also be observed over the past 12 years. Between 2000 and 2012 our population grew by 13 per cent our economy grew by 31 per cent while emissions decreased by two per cent; reflecting a 26 per cent improvement in emissions intensity, over the same period emissions per-capita declined by approximately 14 per cent.

MANITOBA GHG INTENSITY

Source: Manitoba Conservation and Water Stewardship, 2013



5. INTER-JURISDICTIONAL COOPERATION

Manitoba is a North American leader in the global efforts to combat climate change. The province has collaborated with jurisdictions at the regional, national and international levels in reducing GHG emissions through various initiatives:

WESTERN CLIMATE INITIATIVE (WCI)

The WCI is a collaboration of jurisdictions from the US and Canada who worked together to develop a multi-sector, market-based regional cap and trade program to reduce GHG emissions.

NORTH AMERICA 2050 (NA2050) – A PARTNERSHIP FOR PROGRESS

Manitoba participates in NA2050 – a co-ordinated effort among North American jurisdictions committed to policies leading toward a low-carbon economy.

CLIMATE GROUP – DECLARATION OF FEDERATED STATES AND REGIONS

The States and Regions program fosters partnerships between developed and developing nation sub-national governments, resulting in projects such as assessment of regional vulnerability to climate change impacts. At the 2012 United Nations Conference on Sustainable Development (Rio+20), where Manitoba played an active role, the coalition also announced a new carbon disclosure partnership for the sub-national government level, which nine regions will pilot.

THE CLIMATE REGISTRY (TCR)

Manitoba remains an active member of The Climate Registry (TCR), a US-based, non-profit organization that helps with measuring, tracking and public reporting of GHG emissions. TCR establishes consistent, transparent standards throughout North America for businesses and governments to calculate, verify and publicly report their carbon footprints in a single, unified registry.

6. SECTOR ACTIONS – RESULTS TO 2012

6.1 | ENERGY: INCREASED INVESTMENT IN END-USE EFFICIENCY AND CLEAN ENERGY

EXPANDING ENERGY EFFICIENCY

Energy efficiency is one of the most effective ways to save money, make businesses more competitive and reduce GHG emissions. A variety of programs offered through Manitoba Hydro's Power Smart Program target energy savings from residential, commercial, farm and industrial buildings. Key initiatives being undertaken by Manitoba Hydro and the Manitoba government include:

- implementing the Pay as You Save on-meter financing program that helps overcome high, upfront costs that prevent households from implementing energy saving retrofit measures
- enhancing Manitoba's successful Affordable Energy Program, in partnership with social enterprises, to help build community capacity, create jobs and maximize economic benefits
- expanding The Green Building Policy so that more government-funded building construction, renovation and operations are subject to energy efficiency requirements
- expediting adoption of National Building Code energy efficiency updates to ensure Manitoba homes and businesses achieve the lowest lifetime costs for energy
- advancing vehicle-related efficiency through green fleet purchasing policies, supporting higher vehicle fuel efficiency standards and promoting active transportation
- supporting the expansion of voluntary programs to benchmark, rate and label building energy performance

EXPANDING RENEWABLE ELECTRICAL POWER GENERATION:

With over 99 per cent of Manitoba's electricity generation coming from renewable sources, Manitoba's GHG emissions from this sector are among the lowest in Canada. Manitoba was able to meet its own domestic electricity needs, while at the same time export clean renewable electricity to other jurisdictions. Manitoba Hydro is accelerating Manitoba's clean energy portfolio by:

- ensuring the planning, design, consultations and negotiations necessary for developing substantial new hydroelectric generation, including the Keeyask (695 MW) and Conawapa (1485 MW) generating stations, proceed through environmental and economic review (these new generating stations are being designed to greatly reduce environmental impacts and are being developed in collaboration with First Nations)
- improving Manitoba's transmission system reliability, increasing export capabilities and enhancing the development of new hydro and wind energy by constructing a new Bipole III transmission line, expanding interconnections to the US, strengthening the Dorsey convertor station and adding the new Riel convertor
- working to eliminate the dependence of northern off-grid communities on diesel generation and ensuring all Manitoba communities have access to clean, renewable power

EXPANDING EMERGING ENERGY (GEOTHERMAL POWER, SOLAR HEATING AND BIOFUELS)

One of Manitoba's key strengths is its access to sources of green energy and new technologies. Using our geothermal, solar and biofuel resources is an effective way of making our energy supply more environmentally friendly. The province is a national leader in shifting toward green heating options including geothermal heating and cooling, solar heating and biomass energy.

Measures designed to encourage the development and use of green energy technologies include:

- providing tax credits and grants to eligible residential and commercial building owners for installing geothermal heat pump systems through the expanded Geothermal Energy Incentive Program and on-meter financing available through Manitoba Hydro
- providing opportunities for Manitoba residential, commercial and institutional sectors to secure financial support for solar thermal heating systems through the Green Energy Equipment Tax Credit and solar water heating systems for residential water tanks through Manitoba Hydro's Residential Earth Power Loan

MOVING AWAY FROM COAL AND OTHER FOSSIL FUELS

Manitoba's emissions tax on coal came into effect in 2012, with all revenues from this tax being redirected to fund biomass energy, through the Biomass Energy Support Program. In addition, Manitoba introduced a regulation banning the use of coal and petroleum coke for space heating – the first of its kind in Canada.

- The Manitoba government released its Clean Energy Strategy, which defines a pathway that will reduce Manitoban's reliance on fossil fuels for electricity generation, space heating and cooling, water heating and transportation, while maximizing local economic benefits.

6.2 | TRANSPORTATION: GREENING OUR FLEET

Transportation plays a vital role in the economic development of our province and the quality of life of Manitobans. The province relies heavily on land and winter road networks to move freight and people in and between localities and market centres.

Manitoba's efforts to reduce transportation emissions have centred on promoting green options. For example:

- As an early action in Manitoba's 2008 climate change plan, the province provided incentives to Manitoba's commercial trucking industry for installing emission-reduction technologies through the GrEEEn (economically and environmentally efficient) Trucking Program. Through this program, an estimated 7,135 tonnes of GHG emissions were reduced from 2009 to 2012.
- The province helped expand the uptake of low and zero emission vehicles through the Manitoba Hybrid Rebate Program (which ran from 2006 to 2010), the Plug-in Hybrid Electric Vehicle Demonstration Project, the launch of Manitoba's Electric Vehicle Road Map and through funding provided to the Electric Vehicle Technology and Education Centre at Red River College.
- The province partnered with Manitoba Hydro, Mitsubishi Heavy Industries and New Flyer to develop an advanced, all-electric, battery-powered transit bus. The electric bus project is one of a number of actions the province is taking to realize the benefits of electric vehicles for Manitoba.

6.3 | AGRICULTURE: SUSTAINABLE ON-FARM PRACTICES AND ENERGY ALTERNATIVES

In Manitoba, the agricultural industry is a key driver of productivity and prosperity. Approximately one-third of Manitoba's GHG emissions come from this sector, which strives to reduce its climate impact by promoting innovative agricultural technologies and practices. Manitoba has established a set of policies and measures that enhance agricultural productivity and competitiveness and promote local food and bioproducts while reducing the sector's emissions.

Manitoba has implemented a number of programs including the Manitoba Sustainable Agriculture Practices Program and Environmental Farm Action Program that reduce GHG emissions and generate co-benefits for the sector by providing:

- cost-shared funding and technical assistance for agricultural producers to implement eligible beneficial management practices that reduce GHG emissions, while promoting water protection and conservation of nutrients
- a tax credit incentive that offsets part of the purchase price of eligible, odour-control equipment that may reduce GHG emissions from manure
- opportunities for producers to assess agri-environmental issues in their operations and work to reduce the risks and build on the assets
- opportunities for producers to develop a comprehensive approach to burning crop residue and the resulting GHG emissions, air quality issues, human health concerns and farm crop management challenges associated with this practice

Manitoba launched its Bioproducts Strategy that creates green jobs and green products that provide value added to rural economies, while reducing GHG emissions. A component of this strategy is the Biomass Energy Support Program that provides financial grants to encourage coal users to switch to biomass energy products and support the expansion and growth of the biomass energy production industry.

Increasing population and changing consumption patterns emphasize the benefits of buying locally grown foods. The Manitoba government has implemented the Northern Healthy Food Initiative and the Buy Manitoba Program that provides opportunities for increased local food self-sufficiency in northern Manitoba and increased buy-in for locally grown food through specialized services and consumer awareness.

6.4 | MUNICIPALITIES: BUILDING LOCAL CAPACITY FOR CLIMATE ACTION

The Federation of Canadian Municipalities (FCM) reveals that about 50 percent of Canada's emissions are directly or indirectly influenced by municipal governments. Municipalities play a unique position in reducing GHG emissions and adapting to the impacts of climate change, while creating more sustainable, healthier and economically strong communities. The Manitoba government has engaged its municipalities in taking meaningful action on climate change.

Manitoba has introduced a landfill levy along with a province-wide Waste Reduction and Recycling Program (WRARS) administered by Green Manitoba, a special operating agency of the Manitoba government. This program is designed to provide support and incentives to municipalities and local government districts for recycling and waste management, including electronic waste and household hazardous waste management. The program produced the following results:

There are currently over 60 composting operations that exist in Manitoba municipalities that divert waste from landfills and contribute to reduced municipal GHG emissions.

- Between 2009 and 2012, levy revenues totalling $32 million were paid to municipalities providing residential recycling services. In 2012, of 197 municipalities, 181 reported recycling eligible for WRARS Recycling Rebate that was worth over $7.8 million, an equivalent of 68,328 tonnes of recycled waste (or a per capita of 66 kg/person).
- The Community-led Emissions Reduction (CLER) Program, a pilot program with 12 municipalities and six community organizations in Winnipeg and Brandon aimed to reduce 40,000 tonnes of GHG emissions by March 2012. The CLER program implemented a total of 84 GHG emissions reduction projects. Of this number, six projects were extended beyond the originally planned life of the program. In addition, a total of almost $372,037 was leveraged and provided in-kind contribution in the amount of almost $600,000.

Results of these municipal initiatives include a host of other economic, social and environmental benefits associated with reduced GHG emissions, energy efficiency and green energy measures to the municipalities.

6.5 | MUNICIPALITIES: SUPPORT FOR PUBLIC TRANSIT AND ACTIVE TRANSPORTATION

Increased transit ridership helps remove vehicles from our roads, reduces wear and tear on infrastructure and reduces GHG emissions. Fast, convenient, comfortable and affordable transit services are crucial to encourage people to shift away from using personal vehicles. To support rapid transit Manitoba has:

- provided $17.5 million toward the construction of the Phase 1 Southwest Rapid Transit Corridor, with the balance of Manitoba's capital contribution provided through Manitoba's legislated 50/50 transit partnership
- committed up to $225 million towards future Phase 2 development of the Southwest Rapid Transit corridor, running from Pembina Highway and Jubilee Avenue to southwest Winnipeg

Manitoba promoted public transportation and active transportation that provide multiple benefits such as savings from fuel consumption, traffic congestion and improved health and safety for the communities. This includes:

- financial support for active transportation pathways through the Small Communities Active Transportation Fund to enable rural municipalities to develop new active transportation infrastructure or renovate existing infrastructure
- annual operating grant funding under the 50/50 transit funding partnership with each municipality that operates a public transit system
- a new Active Transportation Fund to help rural communities start projects and improve local infrastructure designed to encourage people to use alternatives to motor vehicle
- community-based initiatives on the annual commuter challenge that mobilizes Manitoba workplaces and communities to participate in a friendly competition to reduce GHG emissions

6.6 | BUSINESS: ENHANCING COMPETITIVENESS THROUGH CLIMATE - FRIENDLY SOLUTIONS

The private sector plays an important role in addressing climate change by reducing its GHG emissions while maintaining competitiveness. The Manitoba government has promoted GHG emissions reduction opportunities, energy efficiency and clean energy options. Activities include:

- Manitoba launched the Climate Investment Pilot Program to help businesses and not-for-profit organizations in Manitoba measure and reduce their GHG emissions through the Corporate Capacity Building Grant and the Climate Mitigation Action Grant.
- In *Tomorrow Now*, Manitoba committed to develop a green economy and green jobs action plan that brings together local expertise and works with partners to implement recommendations of *Growing Green: The Manitoba Bio-products Strategy* with a goal to double the amount of revenue generated by the sector by 2020.
- Manitoba maintains a Green Registry website that is designed to help Manitobans obtain relevant information to measure, reduce and report their GHG emissions.
- More than 30 companies in Manitoba currently produce a wide range of products from renewable agricultural and forestry resources. Manitoba will work with partners, such as the Life Sciences Association of Manitoba, to implement the recommendations of *Growing Green: The Manitoba Bio-products Strategy* with a goal to double the amount of revenue generated by the sector by 2020. Priority will be given to developing a sustainable supply of biomass fibre for use in energy, chemicals, textiles, building materials, composites and plastics.
- Through *Tomorrow Now*, Manitoba has committed to building on the province's advantages as a hub for sustainable development and green innovation by collaborating with stakeholders and private industry to lead the development of a multi-sector action plan to strengthen our green economy.

6.7 | GOVERNMENT: LEADING BY EXAMPLE

The Manitoba government has implemented an array of climate change and clean energy initiatives within its buildings and operations to achieve GHG reductions and cost savings in its facilities, operations and vehicle fleets.

Manitoba passed *The Greening of Government Vehicles Regulation* under *The Climate Change and Emissions Reductions Act*. Provincial government departments that use new, private vehicles within the government fleet must meet a prescribed fuel efficiency standard and implement actions and measures for reducing the total amount of fuel consumed by the government fleet. This includes implementing policies to reduce fuel consumption through ridesharing and anti-idling.

Manitoba passed *The Green Buildings Regulation* under *The Climate Change and Emissions Reductions Act*. The regulation requires that construction projects subject to the regulation must be designed to be at least 33 per cent more efficient than the building would be if it were designed to meet the minimum requirements of the Model National Energy Code for Buildings (1997). This standard must also be achieved for new buildings, as defined in the Green Building Regulation, when government is the first tenant to occupy the area.

Through the Greening the Manitoba Legislature Committee, over 50 initiatives were reported to enhance sustainability practices at the Manitoba Legislature in the areas of energy efficiency, waste minimization, procurement, water conservation, transportation, staff engagement and awareness. Results include increased energy efficiency and acquiring baseline information, increased waste diversion, reducing GHG's and protecting water and air. These initiatives have been part of day-to-day maintenance and operations of the legislative building for some time.

6.8 | OTHER CLIMATE CHANGE ACTIONS: INCREASING PUBLIC AWARENESS

As part of its public education and outreach, Green Manitoba initiated climate change education awareness activities. The goal was to increase awareness and create buy-in for Manitobans to help them make decisions and take action on climate change. From 2010 to 2012, Green Manitoba worked with Green Learning, along with other Manitoba government departments, to co-develop and pilot an alternative energy and climate change education workshop on the COOL 2.0 online climate change education site. In addition, the agency, in partnership with the Climate Reality Project Canada, held training sessions for new presenters and presentations to a total of 2,850 people throughout Manitoba.

Manitoba Education and Advanced Learning is currently integrating climate change into the Science and Social Studies curricula for Grade 5 through Grade 12.

7. FUTURE EMISSION REDUCTIONS

7.1 | MANITOBA HYDRO – POWER SMART

Manitoba Hydro is the province's major energy utility, providing electricity, natural gas and energy services across Manitoba. Energy efficiency is a fundamental goal underlying all areas of its business. Manitoba Hydro's demand side management initiative, Power Smart, consists of energy conservation and load management activities, designed to lower the demand for electricity and natural gas in Manitoba.

This initiative is one of the options available for meeting the province's electrical needs, and plays an important role in the corporation's overall integrated resource plan. The initiative reduces GHG emissions in two ways: directly – by reducing the amount of natural gas consumed in Manitoba, and indirectly – by allowing Manitoba Hydro to export surplus electricity. Electricity exports displace electricity generated by fossil fuels. Through Power Smart, Manitoba Hydro encourages residential, commercial, industrial and agricultural customers to save energy while saving millions of dollars on their utility bills.

The Manitoba government and Manitoba Hydro work together to support energy-efficient codes and standards. Through applying these codes and standards, the 2013 Power Smart Plan forecasts capacity savings of 154 MW; energy savings of 779 gigawatt-hours (GWh); and natural gas savings of 13 million cubic metres annually, by 2027/28.

Considering the application of these energy-efficient codes and standards combined with energy savings to date, the plan forecasts capacity savings of 286 MW, energy savings of 1,355 GWh and natural gas savings of 21 million cubic metres annually, by 2027/28, through our energy efficient codes and standards. Because of these savings, a GHG emissions reduction of 955 kt is expected by 2027/28.1

Manitoba Hydro also considers efficiency opportunities in its internal operations. Supply Efficiency Initiatives optimize Manitoba Hydro's own use of electricity and increase the production capability of existing facilities.

7.2 | FUTURE CLEAN ENERGY EXPORTS

Under average flow conditions, and with increased generation capacity from Keeyask and Conawapa, Manitoba Hydro's clean electricity exports will reduce emissions in other jurisdictions by approximately 62.6 Mt of CO_2e from 2014 through 2025.2 While these emissions reductions occur outside of our provincial borders, this has the equivalent global impact of removing approximately 12.5 million vehicles from the roads.

1 Manitoba Hydro, 2013-16 Power Smart Plan – 15 year Supplementary Analysis Report

2 Manitoba Hydro, Needs For and Alternatives To, Chapter 13 – *Integrated Comparisons of Development Plans – Multiple Account Analysis*, August 2013, Figure 13.8, Page 48

7.3 | BRADY ROAD RESOURCE MANAGEMENT FACILITY, METHANE GAS CAPTURE SYSTEM

A landfill gas collection system at the City of Winnipeg's Brady Road Resource Management Facility became operational in August 2013. The Manitoba government contributed more than $2.5 million for the construction the collection and treatment system.

The system captures and treats landfill gases, which are produced when organic waste decomposes. The gases are mostly made up of methane, a greenhouse gas that has a global warming potential 21 times more potent than carbon dioxide.

In 2013, the system reduced emissions by 43 kt of CO_2e during the facility's first five months of operation. GHG reductions from the facility are projected to range 98 to 112 kt of CO_2e in 2014.

7.4 | MANITOBA'S COAL AND PETROLEUM COKE HEATING BAN

Manitoba announced that it would ban the use of coal and petroleum coke for space heating purposes. The petroleum coke ban took effect in December 2013, while the coal ban is being phased in to allow the biomass energy sector to respond to growing demand. By June 2017, coal will no longer be permitted for use in space heating applications.

In 2012, Manitoba's *Emissions Tax on Coal Act* came into effect. All revenues from this tax are being redirected to support the transition from coal to carbon neutral biomass energy. Key benefits include:

- building a coal-free Manitoba by harnessing waste energy found in forestry and agricultural residues
- shifting from debris burning to biomass production to increase the use of woody and crop debris from forest harvesting and agricultural activities to produce biomass for emerging biofuel and bioenergy markets, creating a climate for investment and business development

7.5 | DEVELOPING MANITOBA'S "NEXT GENERATION" CLIMATE CHANGE ACTION PLAN

As committed to in *Tomorrow Now*, Manitoba is developing new climate change and green economy action plans that will build on the former *Beyond Kyoto* plan. With help from the International Institute for Sustainable Development, Manitoba will talk with industry and stakeholders to set out our new vision for reducing GHG emissions and adapting to the effects of a changing climate. Manitoba's new climate change action plan will develop options for reducing emissions today and well into the future.

8. ADAPTING TO CLIMATE CHANGE: PREPARING FOR THE FUTURE

8.1 | COMPLETED AND ONGOING ACTIVITIES

Adapting to the impacts of a changing climate not only presents risks as highlighted in the earlier sections of this report but also beneficial opportunities such as longer growing seasons, increased plant productivity and reduced costs of certain infrastructure. Effective adaptation requires a better understanding of the social, economic and environmental risks and opportunities associated with climate change.

Manitoba has successfully implemented its fifteen adaptation strategies committed to in its *Beyond Kyoto* Manitoba's action plan on climate change and has initiated actions to build on those outcomes. Among the key adaptation initiatives (both completed and ongoing) undertaken by Manitoba are:

- Enhancing knowledge and tools to increase understanding of climate change impacts and adaptation in Manitoba. Decision-makers and stakeholders need to better understand how and why the climate is changing to identify ways to reduce and manage risks. Manitoba's actions on adaptation have focused on building its capacity to adapt to anticipated climate impacts through research, piloting of adaptation tools, risk assessments and knowledge sharing to advance understanding of climate change impacts and adaptation. These initiatives include:
  - The Prairies Regional Adaptation Collaborative (PRAC) and the four new climate change adaptation projects. These projects – supported by Natural Resources Canada (NRCan) – seek to increase understanding of the impacts, risks and vulnerabilities associated with climate change and potential adaptation options for Manitoba's water, terrestrial (forest, grassland/forage) resources, wetlands, coastal zone, and the sectors of agriculture, mining, and northern transportation, as well as of policy enablers and barriers to mainstreaming climate change adaptation.
  - Weather and climate data inventory and climate data modelling workshops to assess climate data and information needs and identify ways to develop a sound climate data management system.
  - Carbon monitoring of carbon fluxes on a 25.1 ha. poplar plantation in Manitoba to measure its energy, water and carbon balance as well as the vertical flux of latent heat (water vapor), sensible heat (heat energy) and carbon dioxide balances of the plantation using an Eddy Covariance (HP11) Flux Tower; and carbon budget modelling for the Manitoba Hydro's Proposed Bipole III Right of Way Footprint using the Carbon Budget Model for the Canada Forest Sector developed by the Carbon Accounting Team of the Canadian Forest Service.

- Integrating climate change adaptation into existing provincial planning and decision-making frameworks. Manitoba is working to identify and manage climate-related risks and carry out actions that reduce vulnerability and enhance resilience. Efforts to incorporate climate change adaptation into existing provincial government planning, emergency preparedness and flood mitigation are in being put in place to protect communities and reduce losses. These include:

  - **Launching of the Climate Change Adaptation Pathway**
    Manitoba developed a Climate Change Adaptation Pathway that will guide future adaptation efforts. Manitoba also created an Inter-departmental Climate Change Impacts and Adaptation Working Group tasked to co-ordinate implementation of the pathway's three-interlinked phases: government- and province-wide risk assessments, provincial adaptation strategy and action planning.

  - **Developing new standards and regulations**
    Manitoba Infrastructure and Transportation (MIT) initiated various actions to adapt to unavoidable climate change and increase infrastructure resiliency. These include the development of new standards for flood protection by creating a designated flood area; review of hydrotechnical design standards for bridges and large culverts; initiation of flood mitigation studies for the Assiniboine River and Lake Manitoba; creation of advisory bodies such as the 2011 Flood Review Task Force and the Lake Manitoba and Lake St. Martin Regulation Review Committee to provide recommendations for improving flood preparation and the regulation of water levels and management of flooding on both lakes

  - **Expanding flood mitigation programs**
    MIT launched and expanded programs to help vulnerable communities construct permanent flood protection dikes as well as help individual home, business and cottage owners in targeted areas to construct permanent flood mitigation works.

  - **Enhancing emergency preparedness**
    The Manitoba Emergency Measures Organization continued to work with various partners to increase awareness, improve public alerting and reduce severe weather impacts in Manitoba.

  - **Enhanced land use planning**
    Manitoba Local Government developed planning resource guides available to local planning authorities to provide guidance on how to integrate adaptation and mitigation strategies into their development plans and policies and apply them to their communities.

- Engagement with other jurisdictions to create enabling action on adaptation. Through the Regional Adaptation Collaborative (RAC) and Adaptation Platform programs of Natural Resources Canada, Manitoba engaged with other prairie provinces and other RAC partners across the country to enhance collaboration and co-ordinate investments on climate change adaptation. This inter-jurisdictional collaboration aims to promote knowledge sharing, leverage resources and expertise and increase uptake and distribution of adaptation tools and products to support public and private sectors in adaptation planning and implementation.

  The implementation of the Prairies Regional Adaptation Collaborative (PRAC) 2, a joint undertaking of Manitoba, Alberta and Saskatchewan under the adaptation platform, will enhance co-operation within the region and beyond.

8.2 | ADAPTATION – NEXT STEPS

To achieve commitments made in *TomorrowNow*, the Manitoba government will continue to carry out actions to adapt to the effects of climate change, while reducing GHG emissions. The province will implement the three-phased approach to adaptation planning as outlined in our Climate Change Adaptation Pathway. Through the Inter-departmental Climate Change Impacts and Adaptation Working Group, Manitoba will undertake government- and province-wide risk assessments that will lead to the development of the provincial adaptation strategy and action plan.

An important part of this plan is better understanding of climate change through the development of tools and improved access to, and use of, climate data and information to support evidence-based adaptive planning. Essential to the success of the pathway is a co-ordinated plan to implement and align the provincial adaptation strategy with provincial departments and municipal governments' priorities, plans and regulations as well as measuring adaptation progress.

Photos courtesy of Travel Manitoba, Winnipeg Transit, Tourism Winnipeg

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